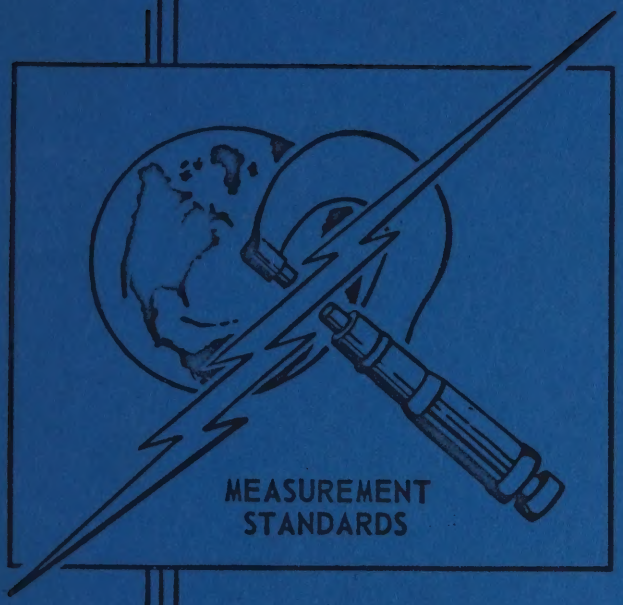
10

DEPARTMENT OF THE NAVY

BUORD-BUSHIPS

CALIBRATION PROGRAM

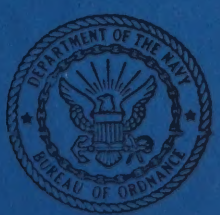


Secondary Standards Laboratory

INSTRUMENT CALIBRATION PROCEDURE

ICP: 7802

GENERATOR, SQUARE WAVE
TEKTRONIX 105



NAVAL INSPECTOR OF ORDNANCE

POMONA CALIFORNIA

DEPARTMENT OF THE NAVY

BUREAU OF ORDNANCE

SECONDARY STANDARDS LABORATORY

INSTRUMENT CALIBRATION PROCEDURE

NO: 7802

GENERATOR, SQUARE WAVE

TEKTRONIX 105

Approved by F. L. Roach

F. L. ROACH, LT, USN

22 OCTOBER 1958

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INSTRUMENT CALIBRATION PROCEDURE

NO: 7802

GENERATOR, SQUARE WAVE
TEKTRONIX 105

1. INTRODUCTION

1.1 This procedure describes the calibration of the Tektronix 105 Square Wave Generator, herein referred to as the Test Instrument.

1.2 Read the entire procedure before starting the calibration.

1.3 All instruments used during this calibration must bear current calibration servicing identification tabs.

2. EQUIPMENT REQUIRED OR EQ

2.1 Counter, Frequency: HP 524B

2.2 Converter, Frequency: HP 525A

NOTE

To accomplish this procedure, any plug-in unit or Blank Panel may be employed. The Model 525A Frequency Converter has been selected in this procedure as a representative plug-in unit which the majority of standards laboratories will have available. If other plug-in units are used, consult the manufacturer's instruction manual for appropriate control adjustments.

2.3 Voltmeter: Weston 622, ranges 1000/500/200/100/50/20/5/2

2.4 Volt-Ohm-Milliammeter: Simpson 260

2.5 Auto-transformer: Superior Electric UC-1M

2.6 Oscilloscope: Tektronix 545 with a 53/54B plug-in preamplifier installed

2.7 VTVM: HP 400H

2.8 Oscillator, Wide Range: HP 200 CD

2.9 Resistor, Load: 600$\sim$, 1 Watt, 5% non-inductive

2.10 Resistor, Terminating: Tektronix B93-R (supplied with the Test Instrument)

2.11 Interconnecting leads

2.11.1 Coaxial cable, Tektronix P93 (93 ohm 42 inch cable supplied with the Test Instrument)

2.11.2 Coaxial cables as required

2.11.3 Interconnecting leads as required

3. PRELIMINARY OPERATIONS

3.1 PRELIMINARY INSPECTION

3.1.1 Remove the four machine screws holding the rubber feet on the bottom of the Test Instrument.

3.1.2 Slide the Test Instrument forward out of its case.

NOTE

On instruments with the fan mounted on the case, reach inside and unplug the fan motor before completely removing the Test Instrument from its case.

3.1.3 Inspect the Test Instrument for cleanliness, damage, loose tubes, and correct fuse rating (4AG, 3A "Slo-Blo"). Take any required corrective action.

3.1.4 If the fan is mounted on the Test Instrument chassis, remove the fan blade to make adjustments more accessible and safer to reach.

3.1.5 Place the Test Instrument in its normal position.

3.1.6 Observe the Test Instrument meter. If necessary, adjust the mechanical zero for a zero meter indication.

3.2 INITIAL CONDITIONS

3.2.1 Connect all applicable equipment except the Test Instrument to the appropriate power source, making sure that all power switches are off.

3.2.2 Adjust the Oscilloscope INTENSITY control fully ccw.

3.2.3 Adjust the Oscillator AMPLITUDE control fully ccw.

3.2.4 Connect the 600Ω load resistor across the Oscillator 600Ω terminals.

3.2.5 Set the Auto-transformer controls as follows:

Voltage control	fully ccw
INPUT switch to	ON
METER switch to	LOAD

3.2.6 Set the VTVM DB-VOLTS switch to 300 VOLTS.

3.2.7 Connect the Test Instrument power cord to the Auto-transformer.

3.2.8 Turn all power switches (except the Test Instrument power switch) on and allow all equipment to warm up for ten minutes before using.

3.2.9 Turn the Test Instrument AC switch ON.

3.2.10 Adjust the Auto-transformer voltage control for an indication of 115 volts on the A.C. VOLTS meter.

3.2.11 Allow the Test Instrument to warm up for ten minutes.

4. VOLTAGE MEASUREMENTS

NOTE

Verify that Section 3 has been performed, then proceed as follows:

4.1 INITIAL CONDITIONS

4.1.1 Set the Voltmeter range switch to 200.

4.1.2 Set the Test Instrument controls as follows:

OUTPUT AMPLITUDE control	fully ccw
SYMMETRY control to	midrange
RANGE switch to	10KC
FREQUENCY control to	midrange

4.1.3 Connect the Voltmeter H terminal to the bus attached to pin 5 of V6 in the Test Instrument.

4.1.4 Connect the Voltmeter unmarked terminal to the bus attached to pin 5 of V4 in the Test Instrument.

4.2 -150 VOLT CHECK

4.2.1 Turn the Test Instrument DC switch to ON.

4.2.2 Record the Voltmeter indication on the "Calibration Report" form. Verify that this indication is within tolerance; if not, adjust R109 (marked ADJ. TO -150) in the Test Instrument for an exact -150 volt indication on the Voltmeter, and record this indication on the "Calibration Report" form.

4.2.3 Adjust the Auto-transformer voltage control for an indication of 105 volts on the A.C. VOLTS meter.

4.2.4 Record the Voltmeter indication on the "Calibration Report" form.

4.2.5 Adjust the Auto-transformer voltage control for an indication of 125 volts on the A.C. VOLTS meter.

4.2.6 Record the Voltmeter indication on the "Calibration Report" form.

4.2.7 Verify that the indications recorded in steps 4.2.4 and 4.2.6 are within tolerance; if not, take the required corrective action and repeat steps 4.1.1 through 4.2.7.

4.2.8 Adjust the Auto-transformer voltage control for an indication of 115 volts on the A.C. VOLTS meter.

4.2.9 Turn the Test Instrument DC switch to OFF.

4.2.10 Disconnect the Voltmeter from the Test Instrument.

4.3 OUTPUT AMPLITUDE RANGE CHECK

4.3.1 Connect the Voltmeter unmarked terminal to the bus connected to pin 5 of V6 in the Test Instrument and the H terminal to the Test Instrument chassis.

4.3.2 Turn the Test Instrument DC switch to ON.

4.3.3 Adjust the Test Instrument OUTPUT AMPLITUDE control fully clockwise.

4.3.4 Record the Voltmeter indication on the "Calibration Report" form. Verify that this indication is within tolerance; if not, adjust R99 (marked ADJ. 175V) in the Test Instrument for a -175 volt indication on the Voltmeter, and record this indication on the "Calibration Report" form.

4.3.5 Adjust the Test Instrument OUTPUT AMPLITUDE control fully ccw.

4.3.6 Set the Voltmeter range switch to 20V.

4.3.7 Record the Voltmeter indication on the "Calibration Report" form. Verify that this indication is within tolerance; if not, take the required corrective action and repeat steps 4.3.1 through 4.3.7.

4.3.8 Turn the Test Instrument DC switch to OFF.

4.3.9 Disconnect the Voltmeter from the Test Instrument.

4.4 METER LIMITER CHECK

4.4.1 Set the Volt-Ohm-Milliammeter range switch to 250V.

4.4.2 Connect the Volt-Ohm-Milliammeter +(plus) lead to pin 1 of V11 and the -(minus) lead to pin 7 of V11.

4.4.3 Turn the Test Instrument DC switch to ON.

4.4.4 Record the Volt-Ohm-Milliammeter indication on the "Calibration Report" form. Verify that this indication is within tolerance; if not, adjust R63 (marked METER ADJ.) for a-65 volt indication on the Volt-Ohm-Milliammeter, and record this indication on the "Calibration Report" form.

4.4.5 Turn the Test Instrument DC switch to OFF, and disconnect the Volt-Ohm-Milliammeter from the Test Instrument.

4.5 METER ADJUSTMENT

4.5.1 Connect a jumper between pin 6 of V1 and pin 6 of V2 in the Test Instrument.

4.5.2 Connect the Volt-Ohm-Milliammeter +(plus) lead to the jumper and the -(minus) lead to pin 7 of V9 in the Test Instrument.

4.5.3 Turn the Test Instrument DC switch to ON.

4.5.4 Record the Volt-Ohm-Milliammeter indication on the "Calibration Report" form. Verify that this indication is within tolerance; if not, adjust R25.1 (marked MV SCREEN V. ADJ.) for an exact-95 volt indication on the Volt-Ohm-Milliammeter and record this indication on the "Calibration Report" form.

NOTE: the value for later model instruments is 80 V. Consult the manual furnished with the unit.

4.5.5 Turn the Test Instrument DC switch to OFF and disconnect the Volt-Ohm-Milliammeter. DO NOT DISCONNECT THE JUMPER CONNECTED IN STEP 4.5.1.

5. SYMMETRY CHECK

NOTE

Verify that Section 3 has been performed, then proceed as follows:

5.1 INITIAL CONDITIONS

5.1.1 Verify that a jumper is connected betweem pin 6 of V1 and pin 6 of V2 in the Test Instrument.

5.1.2 Connect the coaxial cable (item 2.11.1) to the Test Instrument OUTPUT connector.

5.1.3 Connect the Terminating Resistor to the end of the coaxial cable and to the Oscilloscope INPUT A connector.

5.1.4 Set the Test Instrument controls as follows:

OUTPUT AMPLITUDE control to	midrange
RANGE switch to	1.MC
DC switch to	ON
FREQUENCY control for a	full-scale FREQUENCY meter indication

5.1.5 Set the Oscilloscope controls as follows:

HORIZONTAL DISPLAY switch to	MAIN SWEEP NORMAL
TRIGGERING MODE switch to	AUTOMATIC
TRIGGER SLOPE switch to	- INT
TIME/CM switch to	.1 MICROSEC
TIME/CM MULTIPLIER switch to	1
5X MAGNIFIER switch to	OFF
VOLTS/CM switch to	5
VOLTS/CM VARIABLE control to	CALIBRATED
INPUT SELECTOR switch to	AC INPUT A
INTENSITY control for	medium bright trace
VERTICAL POSITION control to	center the presentation
HORIZONTAL POSITION control to	center the presentation

5.2 CONTROL ADJUSTMENTS

5.2.1 Adjust the Oscilloscope VERTICAL POSITION control to place the top of the square wave presentation exactly one centimeter above the center graticule line.

5.2.2 Adjust the Oscilloscope HORIZONTAL POSITION control until the leading edge of the square wave presentation intersects with the second graticule line from the left of the screen and the center graticule line.

5.2.3 Record the horizontal distance in centimeters (along the center graticule line) between the vertical lines of the square wave presentation as the "NOMINAL" value on the "Calibration Report" form.

5.2.4 Set the Oscilloscope TRIGGER SLOPE switch to + INT.

5.2.5 Adjust the Oscilloscope VERTICAL POSITION control to place the bottom of the square wave presentation exactly one centimeter below the center graticule line.

5.2.6 Repeat step 5.2.2.

5.2.7 Record the horizontal distance in centimeters (along the center graticule line) between the vertical lines of the square wave presentation as the "MEASURED" value for step 5.2.3 on the "Calibration Report" form.

5.2.8 Calculate the percent of difference between steps 5.2.3 and 5.2.7 from the formula below and enter it on the "Calibration Report" form as the "ALGEBRAIC ERROR":

$$\text{Percent Difference} = \frac{\text{"NOMINAL" value} - \text{"MEASURED" value} \times 100}{\text{"NOMINAL" value}}$$

Verify that this value is within tolerance; if not, take the required corrective action and repeat steps 5.1.1 through 5.2.8.

5.2.9 Set the Oscilloscope TRIGGER SLOPE switch to - INT.

5.2.10 Repeat steps 5.2.1 through 5.2.9 for all settings of the Test Instrument RANGE switch, setting the Oscilloscope TIME/CM and MULTIPLIER switches as required.

5.2.11 Turn the Test Instrument DC switch to OFF.

5.2.12 Remove the jumper between pin 6 of V1 and pin 6 of V2.

6. OUTPUT LEVEL, RISE TIME AND DECAY TIME CHECKS

NOTE

Verify that Section 3 has been performed, then proceed as follows:

6.1 INITIAL CONDITIONS

6.1.1 Set the Oscilloscope controls as follows:

TRIGGERING MODE switch to	AUTOMATIC
TRIGGER SLOPE switch to	- INT
TRIGGERING LEVEL control to	0
TIME/CM switch to	10 MICROSEC
TIME/CM MULTIPLIER switch to	2
5X MAGNIFIER switch to	OFF
HORIZONTAL DISPLAY switch to	MAIN SWEEP NORMAL
VOLTS/CM switch to	5
VOLTS/CM VARIABLE control to	CALIBRATED
INPUT SELECTOR switch to	DC INPUT A
INTENSITY control for	medium bright trace

6.1.2 Verify that the coaxial cable (item 2.11.1) is connected to the Test Instrument OUTPUT connector and to the Terminating Resistor.

6.1.3 Verify that the Terminating Resistor is connected to the Oscilloscope INPUT A connector.

6.1.4 Set the Test Instrument controls as follows:

OUTPUT AMPLITUDE control to	midrange
RANGE switch to	10 KC
DC switch to	ON
FREQUENCY control for	full-scale FREQUENCY meter indication

6.1.5 Adjust the Oscilloscope VERTICAL POSITION, HORIZONTAL POSITION and FOCUS controls to center and focus the presentation.

6.1.6 If necessary, adjust the Test Instrument SYMMETRY control for equal duration of the positive and negative portions of the square-wave presentation.

6.2 CONTROL ADJUSTMENTS

6.2.1 Adjust the Test Instrument OUTPUT AMPLITUDE control fully clockwise.

6.2.2 Record the Oscilloscope vertical deflection in centimeters on the "Calibration Report" form. Verify that this indication is within tolerance; if not, take the required corrective action and repeat steps 6.1.1 through 6.2.2.

6.2.3 Set the Test Instrument RANGE switch to 1 MC and adjust the FREQUENCY control for a full-scale FREQUENCY meter indication.

6.2.4 Set the Oscilloscope TIME/CM switch to .1 MICROSEC.

6.2.5 Record the Oscilloscope vertical deflection in centimeters on the "Calibration Report" form. Verify that this indication is within tolerance; if not, take the required corrective action and repeat steps 6.1.1 through 6.2.5.

6.2.6 Set the Oscilloscope VOLTS/CM switch to 2.

6.2.7 Adjust the Test Instrument OUTPUT AMPLITUDE control for exactly 4 centimeters of vertical deflection on the Oscilloscope screen.

6.2.8 Set the Oscilloscope TIME/CM MULTIPLIER switch to 1 and the 5X MAGNIFIER switch to ON.

6.2.9 Adjust the Oscilloscope HORIZONTAL POSITION control to position the square wave presentation as shown in Figure 1.

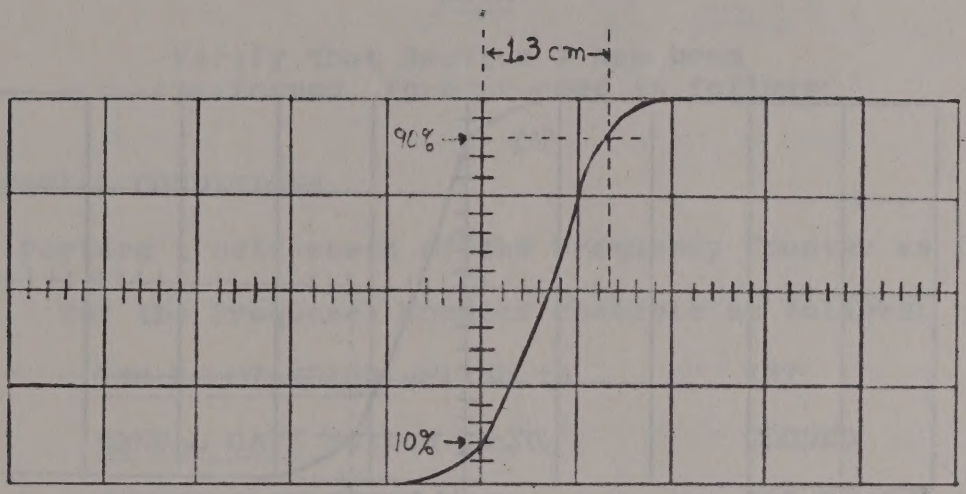

FIGURE 1

TYPICAL WAVE FORM PRESENTATION

NOTE

The square wave rise time to be recorded is the horizontal displacement between the 10% and 90% points, indicated in the above example as 1.3 cm.

6.2.10 Record the square wave rise time in centimeters on the "Calibration Report" form (see Figure 1). Verify that this indication is within tolerance; if not, take the required corrective action and repeat steps 6.1.1 through 6.2.10.

6.2.11 Set the Oscilloscope TRIGGER SLOPE switch to + INT.

6.2.12 Adjust the Oscilloscope HORIZONTAL POSITION control to position the square wave presentation as shown in Figure 2.

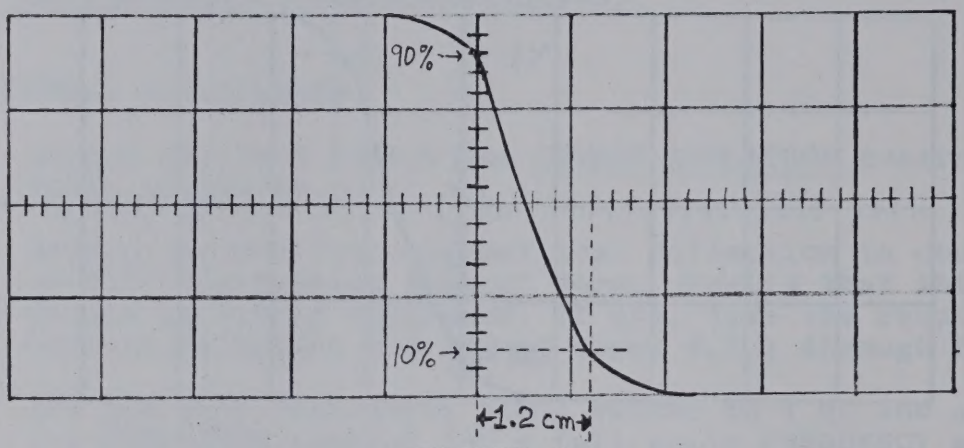

FIGURE 2

TYPICAL WAVE FORM PRESENTATION

NOTE

The square wave decay time to be recorded is the horizontal displacement between the 10% and 90% points, indicated in the above example as 1.2 cm.

6.2.13 Record the square wave decay time in centimeters on the "Calibration Report" form. Verify that this indication is within tolerance; if not, take the required corrective action and repeat steps 6.1.1 through 6.2.13.

6.2.14 Disconnect the Oscilloscope from the Test Instrument.

6.2.15 Disconnect the coaxial cable and Terminating Resistor from the Test Instrument.

7. SYNC INPUT AND SYNC OUTPUT CHECKS

NOTE

Verify that Section 3 has been performed, then proceed as follows:

7.1 INITIAL CONDITIONS

7.1.1 Perform a self-check of the Frequency Counter as follows:

7.1.1.1 Set the Frequency Counter controls as follows:

100 KC STANDARD switch to	INT
MANUAL GATE switch to	CLOSED
FUNCTION SELECTOR to	100 KC CHK
DISPLAY TIME control	fully ccw (or as desired)

7.1.1.2 Set the FREQUENCY UNIT switch to the positions tabulated in the following table, and verify the corresponding counter indications listed under "100 KC CHECK."

FREQUENCY UNIT Switch Settings	100 KC CHECK	10 MC CHECK
10	0100.0000	0000.0000
1	00100.000	10000.000
0.1	000100.00	010000.00
0.01	0000100.0	0010000.0
0.001	00000100.	00010000.

7.1.1.3 Set the FUNCTION SELECTOR switch to 10 MC CHK and verify the corresponding indications listed under "10 MC CHECK."

NOTE

A discrepancy of ±1 count in the last digit is acceptable.

If incorrect indications are obtained, corrective action must be taken before performing the calibration.

7.1.2 Set the Frequency Counter controls as follows:

FUNCTION SELECTOR switch to	FREQUENCY
FREQUENCY UNIT switch to	1
TIME UNIT switch to	100 KC
DISPLAY TIME control to	desired position (usually ccw)
100 KC STANDARD switch to	INT
MANUAL GATE switch to	OPEN

7.1.3 Set the Frequency Converter controls as follows:

MIXING FREQUENCY MCS switch to	0
GAIN control to	MIN

7.1.4 Set the VTVM DB-VOLTS switch to 3 VOLTS.

7.1.5 Set the Test Instrument controls as follows:

OUTPUT AMPLITUDE control to	midrange
RANGE switch to	100 KC
DC switch to	ON
FREQUENCY control	for an indication of 8 on the FREQUENCY meter upper scale
SYNC. AMPL. control	fully ccw

7.1.6 Turn the Test Instrument DC switch to OFF.

7.1.7 Connect the Test Instrument SYNC OUTPUT and GND terminals to the Frequency Counter SIGNAL INPUT connector using coaxial cable.

7.1.8 Connect the Wide Range Oscillator 600Ω terminals to the VTVM INPUT terminals and the Test Instrument SYNC.INPUT terminals, using coaxial cables.

7.1.9 Set the Wide Range Oscillator controls as follows:

Frequency dial to	10
RANGE switch to	X10K
AMPLITUDE control	for a 2.15 volt indication on the VTVM

7.2 CONTROL ADJUSTMENTS

7.2.1 Turn the Test Instrument DC switch to ON.

7.2.2 Adjust the Frequency Converter GAIN control until the tuning eye just closes without overlap (minimum shadow).

7.2.3 Observe the Frequency Counter, it should indicate approximately 80 kcps.

7.2.4 Slowly adjust the Test Instrument SYNC. INPUT AMPLITUDE control (labeled SYNC. AMPL. on some instruments) until the needle of the FREQUENCY meter jumps from 8 to 10. The Frequency Counter should now indicate approximately 100 kcps

7.2.5 Turn the Test Instrument DC switch to OFF.

7.2.6 Adjust the Wide Range Oscillator AMPLITUDE control fully ccw.

7.2.7 Disconnect the Frequency Counter and the Wide Range Oscillator from the Test Instrument.

8. FREQUENCY CHECKS

NOTE

Verify that Section 3 has been performed, then proceed as follows:

8.1 INITIAL CONDITIONS

8.1.1 Verify that steps 7.1.1 through 7.1.3 have been performed.

8.1.2 Connect the Test Instrument OUTPUT connector to the Frequency Counter SIGNAL INPUT connector using a coaxial cable.

8.1.3 Set the Test Instrument controls as follows:

RANGE switch to	100~
FREQUENCY control	fully ccw
DC switch to	ON
SYMMETRY control to	midrange
OUTPUT AMPLITUDE control to	midrange

8.1.4 Adjust the Frequency Converter GAIN control until the tuning eye just closes without overlap (minimum shadow).

8.2 CONTROL ADJUSTMENTS

8.2.1 Adjust the Test Instrument FREQUENCY control for an indication of .100 kcps on the Frequency Counter.

8.2.2 Set the Frequency Counter FREQUENCY UNIT switch to 10 and readjust the Test Instrument FREQUENCY control for an exact .1000 kcps indication on the Frequency Counter.

8.2.3 Record the Test Instrument FREQUENCY meter indication in cps on the "Calibration Report" form. Verify that this indication is within tolerance; if not, adjust R67 (marked 100 CPS) in the Test Instrument for an exact full-scale FREQUENCY meter indication, and record this indication in cps on the "Calibration Report" form.

NOTE

The Test Instrument FREQUENCY meter full-scale markings correspond to the RANGE switch settings.

8.2.4 Set the Frequency Counter FREQUENCY UNIT switch to 1.

8.2.5 Set the Test Instrument RANGE switch to 250~ and adjust the FREQUENCY control for a Frequency Counter indication of .250 kcps.

8.2.6 Set the Frequency Counter FREQUENCY UNIT switch to 10 and readjust the Test Instrument FREQUENCY control for an exact .2500 kcps indication on the Frequency Counter.

8.2.7 Record the Test Instrument FREQUENCY meter indication in cps on the "Calibration Report" form. Verify that this indication is within tolerance; if not, adjust R68 (marked 250 CPS) in the Test Instrument for an exact full-scale FREQUENCY meter indication, and record this indication in cps on the "Calibration Report" form.

8.2.8 Set the Frequency Counter FREQUENCY UNIT switch to 1.

8.2.9 Set the Test Instrument RANGE switch to 1.KC and adjust the FREQUENCY control for an exact 1.000 kcps indication on the Frequency Counter.

8.2.10 Record the Test Instrument FREQUENCY meter indication in cps on the "Calibration Report" form. Verify that this indication is within tolerance; if not, adjust R69 (marked 1 KC) in the Test Instrument for an exact full-scale FREQUENCY meter indication, and record this indication in kcps on the "Calibration Report" form.

8.2.11 Set the Test Instrument RANGE switch to 2.5 KC and adjust the FREQUFNCY control for an exact 2.500 kcps indication on the Frequency Counter.

8.2.12 Record the Test Instrument FREQUENCY meter indication in kcps on the "Calibration Report" form. Verify that this indication is within tolerance; if not, adjust R70 (marked 2.5 KC) in the Test Instrument for an exact full-scale FREQUENCY meter indication, and record this indication in kcps on the "Calibration Report" form.

8.2.13 Set the Test Instrument RANGE switch to 10 KC and adjust the FREQUENCY control for an exact 10.000 kcps indication on the Frequency Counter.

8.2.14 Record the Test Instrument FREQUENCY meter indication in kcps on the "Calibration Report" form. Verify that this indication is within tolerance; if not, adjust R71 (marked 10 KC) in the Test Instrument for an exact full-scale FREQUENCY meter indication, and record this indication in kcps on the "Calibration Report" form.

8.2.15 Adjust the Test Instrument FREQUENCY control for an exact 5.000 kcps indication on the Frequency Counter.

8.2.16 Record the Test Instrument FREQUENCY meter indication in kcps on the "Calibration Report" form. Verify that this indication is within tolerance; if not, take the required corrective action and repeat steps 8.1.1 through 8.2.16.

8.2.17 Set the Test Instrument RANGE switch to 25 KC and adjust the FREQUENCY control for an exact 25.000 kcps indication on the Frequency Counter.

8.2.18 Record the Test Instrument FREQUENCY meter indication in kcps on the "Calibration Report" form. Verify that this indication is within tolerance; if not, adjust R72 (marked 25 KC) in the Test Instrument for an exact full-scale FREQUENCY meter indication, and record this indication in kcps on the "Calibration Report" form.

8.2.19 Set the Test Instrument RANGE switch to 100 KC and adjust the FREQUENCY control for an exact 100.000 kcps indication on the Frequency Counter.

8.2.20 Record the Test Instrument FREQUENCY meter indication in kcps on the "Calibration Report: form. Verify that this indication is within tolerance; if not, adjust R73 (marked 100 KC) in the Test Instrument for an exact full-scale FREQUENCY meter indication, and record this indication in kcps on the "Calibration Report" form.

NOTE

A nonmetallic alignment tool must be used for the following steps:

8.2.21 Set the Test Instrument RANGE switch to 250 KC and adjust the FREQUENCY control for an exact 250.000 kcps indication on the Frequency Counter.

8.2.22 Record the Test Instrument FREQUENCY meter indication in kcps on the "Calibration Report" form. Verify that this indication is within tolerance; if not, adjust C30 (located in the rear section of the RANGE switch) for an exact full-scale FREQUENCY meter indication, and record this indication in kcps on the "Calibration Report" form.

8.2.23 Set the Test Instrument RANGE switch to 1.MC and adjust the FREQUENCY control for an exact 1000.000 kcps indication on the Frequency Counter.

8.2.24 Record the Test Instrument FREQUENCY meter indication in kcps on the "Calibration Report" form. Verify that this indication is within tolerance; if not, adjust C31 (located next to C30) for an exact full-scale FREQUENCY meter indication, and record this indication in kcps on the "Calibration Report" form.

NOTE

If adjustment of C31 is required, steps 8.2.21 through 8.2.24 must be repeated due to interaction of the adjustments (C30 and C31).

8.2.25 Disconnect the Frequency Counter from the Test Instrument.

9. TEST INSTRUMENT EVALUATION

9.1 Complete the "Calibration Report" form and verify that the Test Instrument is in acceptable condition. If not, take the required corrective action, repeat steps 3.1.1 through 8.2.25 as applicable, and then re-evaluate the Test Instrument.

9.2 Unless other instruments are to be calibrated, turn off all equipment power.

9.3 Replace the Test Instrument in its case.

ICP: 7802

STANDARDS LABORATORY CALIBRATION REPORT

NIO-P-45-1 (12-58)

SECTION A

1. STANDARDS LABORATORY
2. SUBMITTING ACTIVITY
3. TEST INSTRUMENT *(Item Calibrated)* Square Wave Generator
4. MANUFACTURER: TEA
5. MODEL NUMBER: 105
6. SERIAL NUMBER

7. REASON FOR SUBMISSION

CERTIFICATION	1
CALIBRATION	X 2
CROSSCHECK	3
OPERATIONAL FAILURE	4

8. DATE OF LAST SERVICING

CERTIFICATION	1
CALIBRATION	2
CROSSCHECK	3

SECTION B

1. CALIBRATION PROCEDURE: ICP: 7802
2. CALIBRATION TECHNICIAN
3. TEST DATE
4. TEMPERATURE -°F
5. RELATIVE HUMIDITY

SECTION C

1. TEST INSTRUMENT EVIDENCED

GOOD CONDITION	1
SEVERE ENVIRONMENT	2
PHYSICAL MISHANDLING	3
AGE AND LONG SERVICE	4
OVERLOAD	5

2. TEST INSTRUMENT FOUND

OUTSIDE ADJUSTMENT TOLERANCE	1
WITHIN ACCEPTANCE TOLERANCE	2
OUTSIDE ACCEPTANCE TOLERANCE	3

3. TEST INSTRUMENT RETURNED

OUTSIDE ADJUSTMENT TOLERANCE	1
WITHIN ACCEPTANCE TOLERANCE	2
OUTSIDE ACCEPTANCE TOLERANCE	3

4. CERTIFICATED OR REPORTED VALUE, IF FIXED STANDARD
5. MAN-HOURS TO CALIBRATE
6. MAN-HOURS TO ADJUST OR REPAIR

SECTION D

CALIBRATION EQUIPMENT
(LIST ALL EQUIPMENT USED IN THIS CALIBRATION)

MANUFACTURER	MODEL NO.	SERIAL NO.	RECALL DATE	MANUFACTURER	MODEL NO.	SERIAL NO.	RECALL DATE

SECTION E

REMARKS

NOTE: INSTRUCTIONS FOR COMPLETING THIS REPORT ARE PROVIDED IN *STANDARDS LABORATORY INFORMATION MANUAL – APPENDIX H*

SECTION F

CALIBRATION DATA

PROCEDURE STEP NO. (1)	FUNCTION TESTED (2)	READING OR VALUE NOMINAL (3)	READING OR VALUE MEASURED (4)	CORRECTED VALUE OF COLUMN ___ (5)	ALGEBRAIC ERROR (6)	CALIBRATION TOLERANCES ACCEPTANCE (7)	CALIBRATION TOLERANCES ADJUSTMENT (8)	READING AFTER ADJUSTMENT (9)
4.2.2	-150 Volt Check	-150 v				±0 v		
4.2.4	Regulation (105 VAC)	-150 v				±2 v		
4.2.6	Regulation (125 VAC)	-150 v				±2 v		
4.3.4	Output Ampl. Range Check	-175 v				±0 v		
4.3.7	Output Ampl. Range Check	-10 v				-15v max		
4.4.4	Meter Limiter Check	-65 v				±0 v		
4.5.4	Meter Adjustment	-95 v				±0 v		
		-80 V (later model set)						
5.2.3	Symmetry Check (1MC)	cm				10% max		
5.2.10	" " (250KC)					10% max		
	" "(100KC)					10% max		
	" "(25KC)					10% max		
	" " (10KC)					10% max		
	" " (2.5KC)					10% max		
	" " (1KC)					10% max		
	" " (250 ~)					10% max		
	" " (100 ~)					10% max		
6.2.2	Output Level at 10 kcps	3 cm				3 cm min		
6.2.5	Output Level at 1 Mcps	3 cm				3 cm min		

NOTE: INSTRUCTIONS FOR COMPLETING THIS REPORT ARE PROVIDED IN *STANDARDS LABORATORY INFORMATION MANUAL – APPENDIX H*

SECTION F

CALIBRATION DATA

PROCEDURE STEP NO. (1)	FUNCTION TESTED (2)	READING OR VALUE		CORRECTED VALUE OF COLUMN ___ (5)	ALGEBRAIC ERROR (6)	CALIBRATION TOLERANCES		READING AFTER ADJUSTMENT (9)
		NOMINAL (3)	MEASURED (4)			ACCEPTANCE (7)	ADJUSTMENT (8)	
6.2.10	Rise Time Check	0 cm				1.8 cm max		
6.2.13	Decay Time Check	0 cm				1.8 cm max		
8.2.3	Frequency Check	100 cps				±3 cps	±2.1cps	
8.2.7	" "	250 cps				±7.5cps	±5.0cps	
8.2.10	" "	1000 cps				±30 cps	±21 cps	
8.2.12	" "	2.5kcps				±75 cps	±53 cps	
8.2.14	" "	10 kcps				±0 cps		
8.2.16	" "	5kcps				±~~150~~ 300 cps	±~~105~~ 210 cps	
8.2.18	" "	25kcps				±750 cps	±530 cps	
8.2.20	" "	100 kcps				±3 kcps	±2.1kcps	
8.2.22	" "	250 kcps				±7.5 kcps	±5.3kcps	
8.2.24	" "	1 Mcps				±30 kcps	±21 kcps	

NOTE: INSTRUCTIONS FOR COMPLETING THIS REPORT ARE PROVIDED IN *STANDARDS LABORATORY INFORMATION MANUAL – APPENDIX H*

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